Ron Rumble Pty Ltd
Consulting Acoustical & Vibration Engineers

ABN: 55 010 264 230

10 July 2008

Townville Ocean Terminal Project
Scrap Ship Loading Measurements

Test Reference: MT/08/6488.Tst

Test Objectives: The objectives of the testing have been:

(i) To identify the process involved in the loading of scrap ships, and

(ii) To quantify the noise emissions associated with each step of this process.

Test Location: Tests were conducted on the breakwater located to the west of the dock, approximately 294m from the bow of the docked scrap ship "Global Discovery" docked at Berth 9. This was also a distance of approximately 340m to the 3rd crane from the front of the ship, which was the most active during the measurement period. The measurement location is shown in Figure 1 and had a clear line-of-sight of the entire ship.

The coordinates of the measurement position were taken using GPS to be E146.82989º, S19.24893º.

Client: IMDM
c/- Emanate Legal
PO Box 1984
Townsville QLD 4810

Contact: Barry Taylor

Test Dates & Time: Sunday 22nd June 2008 from 2100hrs until
Monday 23rd June 2008

Instrumentation:

- Precision sound level meter, Norsonic Type Nor140 S/N 1402770,
- Acoustical calibrator, Rion Type NC72 S/N 10576215.

This equipment has current NATA calibration certification.

96 Petrie Terrace
PO Box 820 Spring Hill Q 4004
Telephone 07 3367 3131
Facsimile 07 3367 3121
Email: admin@ronrumble.com.au

Association of Australian Acoustical Consultants

Test Procedures:

An aerial photograph showing the Breakwater Marina and surrounding area is shown in Figure 1. The location of the scrap ship is also shown in this figure, which was Berth 9. Photos of the scrap ship from the measurement location can be seen in Figure 2 and Figure 3.

Measurements were carried out in accordance with AS1055-1989 "Acoustics - Description and Measurement of Environmental Noise". Overall sound pressure levels and octave band spectra were measured generally using sampling periods of 15 minutes, with observations of individual events noted manually and pausing out non-relevant events such as pass-bys of ferry and vehicles on Entertainment Drive.

Meteorological conditions were fine and cool, with a temperature of approximately 16ºC and light SSW wind of approximately 3m/s with occasional gusts up to 5m/s.

Observations of Loading Process:

The loading of a scrap ship typically consisted of the following activities, which are repeated on a cycle of approximately five minutes:

1. Ship-mounted crane picks up container of scrap metal from truck;
2. Container full of scrap metal is lowered into ship hold;
3. One end of container is released and container is raised, dropping scrap metal into ship's hold. Actual dropping of scrap is sustained for several seconds;
4. Empty container is raised out of hold by one end, rotating freely and occasionally banging on edges of hold and crane supports (refer Figure 4).
5. Empty container is lowered back onto truck, with impact occasionally quite loud (though generally screened by ship itself);
6. Truck leaves via end of dock.

Test Results: Test results are summarised in Table 1 and Table 2. Table 1 summarises the range of noise levels observed for each activity involved in the loading of the scrap ship. Table 2 summarises the measured noise levels in terms of the L_{A90}[1], L_{Aeq}[2], L_{A10}[3], L_{A01}[4] and Max L_A[5] parameters. Table 3 shows typical octave band spectra for the major impact events. Octave band spectra for all measurements taken have been retained on file.

Table 1: Summary of Observed Event Noise Emissions from Loading of Scrap Ship

Activity #	Loading Activity	Range of Maximum Noise Levels Observed Max L_A
1	Crane picks up container of scrap metal from truck	51-53 dBA
2	Container full of scrap metal is lowered into ship hold	51-53 dBA
3	One end of container is released and container is raised, dropping scrap metal into ship's hold	61-67 dBA
4	Empty container is raised out of hold by one end, rotating freely and occasionally banging on edges of hold, crane supports and shifting position	55-75 dBA
5	Empty container is lowered back onto truck, with impact occasionally quite loud (though generally screened by ship itself)	56-71 dBA
6	Truck leaves via end of dock	53-54 dBA

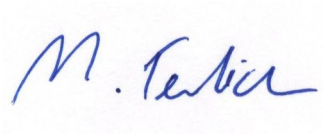
[1] L_{A90} is the A-weighted sound pressure level exceeded for 90% of the time.
[2] L_{Aeq} is the equivalent or energy-averaged A-weighted sound pressure level.
[3] L_{A10} is the A-weighted sound pressure level exceeded for 10% of the time.
[4] L_{A01} is the A-weighted sound pressure level exceeded for 1% of the time.
[5] Max L_A is the maximum A-weighted sound pressure level occurring within the measurement period.

Table 2: Statistical Noise Emissions from Loading of Scrap Ship

Time	Measured Noise Levels (dBA)					Comments
	L_{A90}	L_{Aeq}	L_{A10}	L_{A01}	Max L_A	
21:48-22:03	50	53	54	63	70	Lowering into hold between 2nd and 3rd crane. Suspended empty container banging on ship up to 70dBA. Thump onto trailer approx. 63dBA. Sustained tip into hold of 63 and 64dBA. Drop empty container back onto truck 63-66dBA. Container dangling and banging on ship 56-61dBA. Drop container onto truck, 56dBA.
22:13-22:28	49	54	55	63	75	Sustained tip into hold of 64dBA. Suspended empty container banging on ship 56-60dBA. Tip into hold 61dBA. Suspended empty container banging on ship 64dBA. Tip into hold 59-64dBA. Suspended empty container banging on ship 67dBA. Tip into hold 64-65dBA
22:29-22:46	48	50	52	58	68	Lowering into hold between 1st and 2nd crane. Sustained tip into hold of 67dBA. Next tip 62dBA. Bangs on ship approx. 55dBA.
22:46-22:48	49	54	56	63	71	Lowering into hold between 2nd and 3rd crane. Sustained tip into hold of 64dBA. Suspended empty container banging on ship 58-71dBA. Last container of the night.

Table 3: Typical Spectra of Impact Noise Events

Impact Noise Event	Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								O'all Level (dBA)
	63	125	250	500	1k	2k	4k	8k	
Emptying scrap container into hold of ship	73	67	61	60	58	57	51	35	63
Empty container banging on ship during retrieval	87	86	81	74	64	66	62	48	75



M JC Terlich

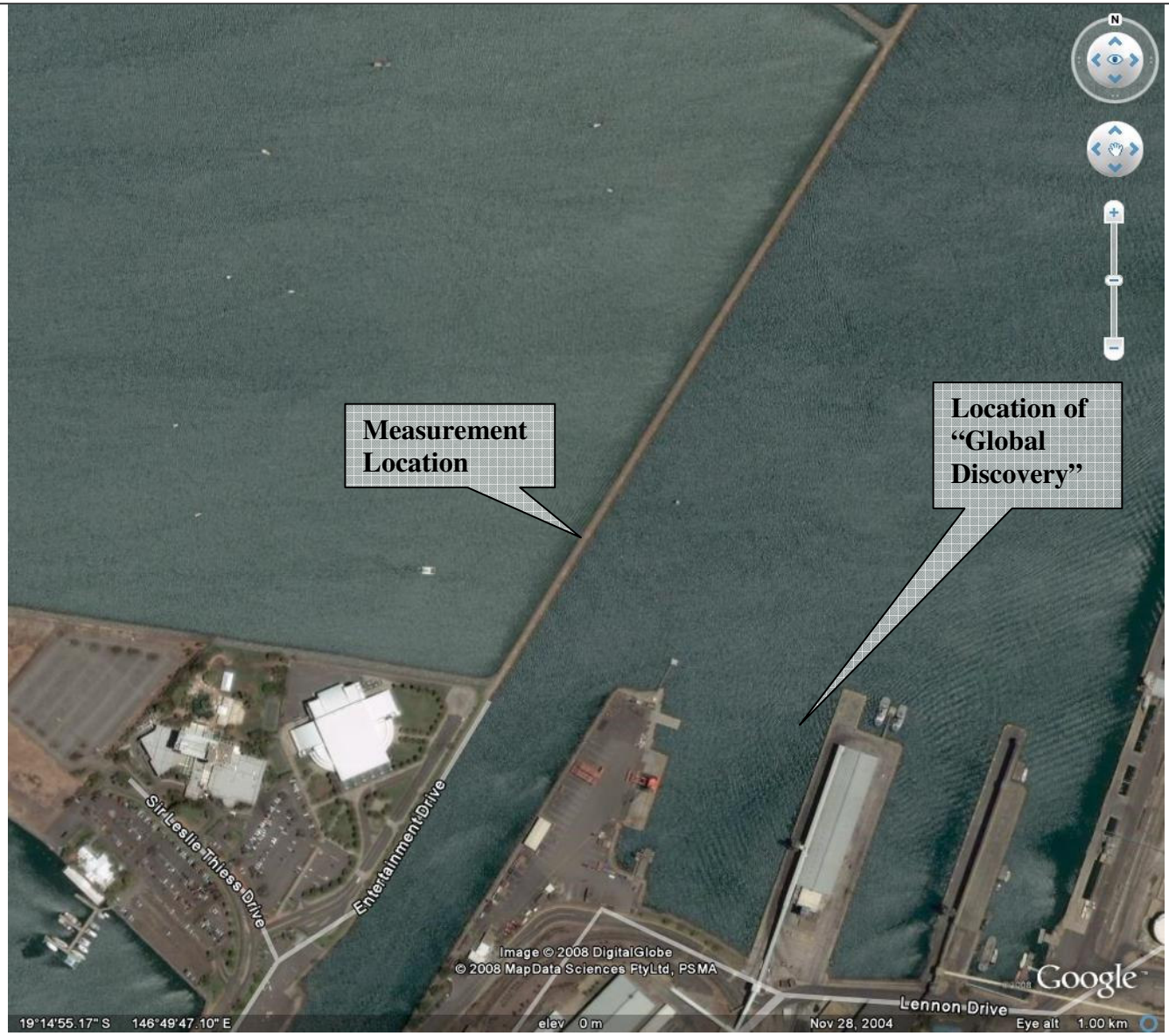


Figure 1: Aerial Photo of Site and Measurement Locations

Figure 2: Photo of Scrap Ship from Measurement Location

Figure 3: Photo of Scrap Ship from Measurement Location – Closer view

Figure 4: Photo of Scrap Ship from Measurement Location – with empty container on crane